

Claims

[c1] What is claimed is:

1.A method for joint equalizing and decoding of an incoming data stream in a P-tap parallel decision-feed-back decoder (PDFD), the method comprising:
shifting a plurality of survivor metrics into a plurality of first shift registers, wherein for each state of a code utilized by the incoming data stream, a survivor metric for a state is shifted into a first shift register for the state, each state first shift register having M cells;
choosing a first survivor metric according to survivor metrics in the first shift registers; and
shifting the first survivor metric into a second shift register having N cells.

[c2] 2.The method of claim 1, further comprising calculating an inter-symbol interference (ISI) value for each state according to the survivor metrics at the M cells of the first shift register for the state and according to the survivor metrics at the N cells of the second shift register.

[c3] 3.The method of claim 2, wherein calculating the ISI value for a particular state comprises summing the results of multiplying the survivor metrics at the M cells of

the first shift register for the particular state and at the N cells of the second shift register with a respective coefficient.

- [c4] 4.The method of claim 1, wherein choosing the first survivor metric comprises choosing the first survivor metric according to the survivor metrics at the M^{th} cells of the first shift registers.
- [c5] 5.The method of claim 4, wherein choosing the first survivor metric further comprises selecting a most frequent survivor metric being present at the greatest number of M^{th} cells of the first shift registers as the first survivor metric.
- [c6] 6.The method of claim 4, wherein choosing the first survivor metric further comprises averaging the survivor metrics at the M^{th} cells of the first shift registers and then selecting a survivor metric being closest to the average as the first survivor metric.
- [c7] 7.The method of claim 1, further comprising performing Viterbi decoding of the incoming data stream.
- [c8] 8.The method of claim 1, wherein the code utilized by the incoming data stream is a Trellis code.
- [c9] 9.The method of claim 1, wherein P is equal to M plus N.

- [c10] 10.A P-tap parallel decision-feedback decoder (PDFD) comprising:
a plurality of state first shift registers, wherein for each state of a code utilized by an incoming data stream, a survivor metric for a state is shifted into the first shift register for the state, each first shift register having M cells;
a decision device coupled to the first shift registers for outputting a first survivor metric according to survivor metrics in the first shift registers; and
a second shift register having N delay cells, wherein the first survivor metric is shifted into the second shift register.
- [c11] 11.The PDFD of claim 10, further comprising a plurality of inter-symbol interference (ISI) value calculators for calculating an ISI value for each state according to the survivor metrics at the M cells of the first shift register for the state and according to the survivor metrics at the N cells of the second shift register.
- [c12] 12.The PDFD of claim 11, wherein the ISI value calculator for a particular state comprises:
a plurality of multipliers for multiplying the survivor metrics at the M cells of the first shift register for the particular state and at the N cells of the second shift

register with a respective coefficient; and a summing unit coupled to the outputs of the plurality of multipliers for summing the results of the multiplications and outputting the ISI value.

- [c13] 13.The PDFD of claim 10, wherein the decision device chooses the first survivor metric according to the survivor metrics at the M^{th} cells of the first shift registers.
- [c14] 14.The PDFD of claim 13, wherein the decision device chooses the first survivor metric by selecting a most frequent survivor metric being present at the greatest number of M^{th} cells of the first shift registers as the first survivor metric.
- [c15] 15.The PDFD of claim 13, wherein the decision device chooses the first survivor metric by averaging the survivor metrics at the M^{th} cells of the first shift registers and then selecting a survivor metric being closest to the average as the first survivor metric.
- [c16] 16.The method of claim 10, wherein the PDFD performs Viterbi decoding of the incoming data stream.
- [c17] 17.The PDFD of claim 10, wherein the incoming data stream is a four-dimensional gigabit Ethernet stream utilizing an 8-state Trellis code.

[c18] 18.The PDFD of claim 10, wherein P is equal to M plus N.